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stay connected

Manual
IMPACT67-PNIO

- Installation
- Configuration Notes
- Startup
- Mapping I/O Data
- Diagnostics
- Technical Data

Publisher's Note

User Manual for

IMPACT67 PN DI16 (Article Number: 55091)

IMPACT67 PN DI8 DO8 (Article Number: 55092)

IMPACT67 PN DO8 (Article Number: 55093)

IMPACT67 PN DO16 (Article Number: 55094)

Version 1.4
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Service and Support

Website:

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In addition, our Customer Service Center (CSC) will be glad to assist you:

Our Customer Service Center can support you throughout your project: planning and the conception of customer applications, configuration, installation, and startup. We also offer competent consulting or – in more complex cases – we even provide direct onsite support.

The Customer Service Center provides support tools. It performs measurements for fieldbus systems, such as PROFIBUS DP, DeviceNet, CANopen, and AS interface, as well as energy, heat, and EMC measurements.

Our coworkers at the Customer Service Center provide their competence, know-how, and years of experience. They are knowledgeable about hardware and software, and compatibility with products made by various manufacturers.

You can contact the Customer Service Center at

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or by email at csc@murrelektronik.de.

About the User Manual and its Structure

Bus Manual:
General explanations and functions for each bus.

On this subject, please click on the links to the next page.

System/Product Manuals:
Describe the system and product-specific features.

Art. No.	Designation
55364	Impact67 ProfiBus
55365	Impact67 CanOpen
55367	Impact67 DeviceNet
55366	Impact67 ProfiNet
55368	Impact67 EtherNet/IP
55369	Impact67 EtherCat

www.murrelektronik.com

Here are links to the bus user manuals:

>>> PROFINET (www.profinet.com)

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Important Information

Symbols and Icons

This manual contains information and instructions you must comply with in order to maintain safety and avoid personal injury or damage to property. They are identified as follows:

Notes indicate important information.

Warnings contain information that, if you ignore this information, may cause damage to equipment or other assets or, if you fail to comply with safety precautions, may constitute a danger to the user's health and life.

These instructions are recommendations issued by Murrelektronik.

Intended Purpose

Before starting the devices, read this manual carefully. Keep it in a location that is accessible to all users at all times.

The products that are described in this manual were developed, manufactured, tested, and documented in compliance with the relevant safety standards. In normal cases, these products do not constitute any danger to persons or objects, provided the handling specifications and safety instructions described in this manual are observed. They conform to the requirements of

- EMC Directive (2004/108/EC)

The products are designed for industrial use. An industrial environment is defined as one in which loads are not connected directly to the public low-voltage power grid. Additional measures must be taken if the products are used in private, business, or trade environments.

The safe, troublefree functioning of the products requires proper transportation, storage, mounting, and installation, and careful operation. Operation of the devices for their intended purposes is only guaranteed when the enclosures are fully mounted. If aggressive media are used, check their material resistance depending on the application.

Current safety and accident prevention laws valid for a specific application must be observed for the configuration, installation, setup, maintenance, and testing of the devices. The power supply must

comply with SELV or PELV. Power sources in accordance with EN 61558-2-6 (transformer) or EN 60950-1 (switched-mode power supply) meet these requirements.

Only use cables that meet the requirements and regulations for safety, electromagnetic compatibility, and, if necessary, telecommunications terminal equipment specifications.

Information on the cables and accessories that are suitable for use with this product are contained in the Section 3.1 of this manual.

Qualified Personnel

Only qualified, trained electricians knowledgeable in the safety standards of automation systems may configure, install, set up, maintain, and test the devices. The requirements concerning qualified personnel are dependent on the requirements profiles described in ZVEI and VDMA. For this reason, electricians must know the contents of the manual "Weiterbildung in der Automatisierung" (Further Training in Automation Systems) published by ZVEI and VDMA published by Maschinenbau-Verlag, Post Box 710864, 60498 Frankfurt, Germany) before installing and maintaining the devices. They are therefore electricians who are capable of assessing the work executed and any possible dangers arising from this due to their professional training, knowledge, experience, and their knowledge of the pertinent standards; or who have a level of knowledge equivalent to professional training due to their many years of activity in a comparable field.

Only Murrelektronik technical personnel are allowed to execute work on the hardware and software of our devices, if they are devices not described in this manual.

Unqualified tampering with the hardware or software, or failure to observe the warnings cited in this manual may result in severe personal injury or damage to property.

1. Description of IMPACT67

Fieldbus modules with IP67 protection are an important module in machine installation and they replace complex wired, and therefore, high-cost terminal boxes. Fieldbuses replace conventional parallel wiring.

An increase in efficiency in installation systems was the prime motivator in developing the IMPACT67. Concentration on what is important, coupled with purposeful connectivity, is our recipe for success to reduce your installation costs.

- Application-specific: compact and dense
- Installation-friendly: well designed and pluggable
- Economic: minimized to what is important

System Design Principle

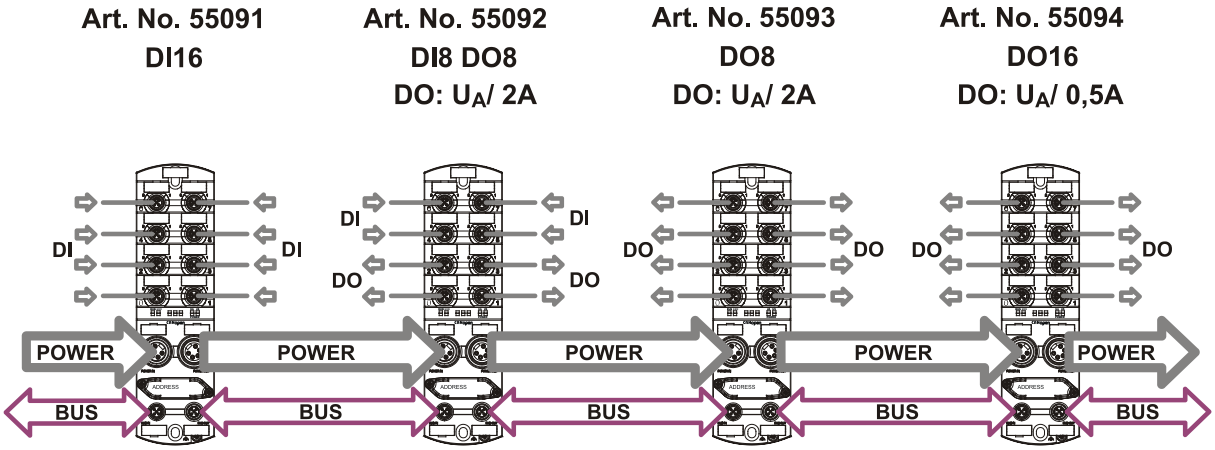


Fig. 1: System design principle

2. Installation

2.1 Mounting

2.1.1 Dimensioning

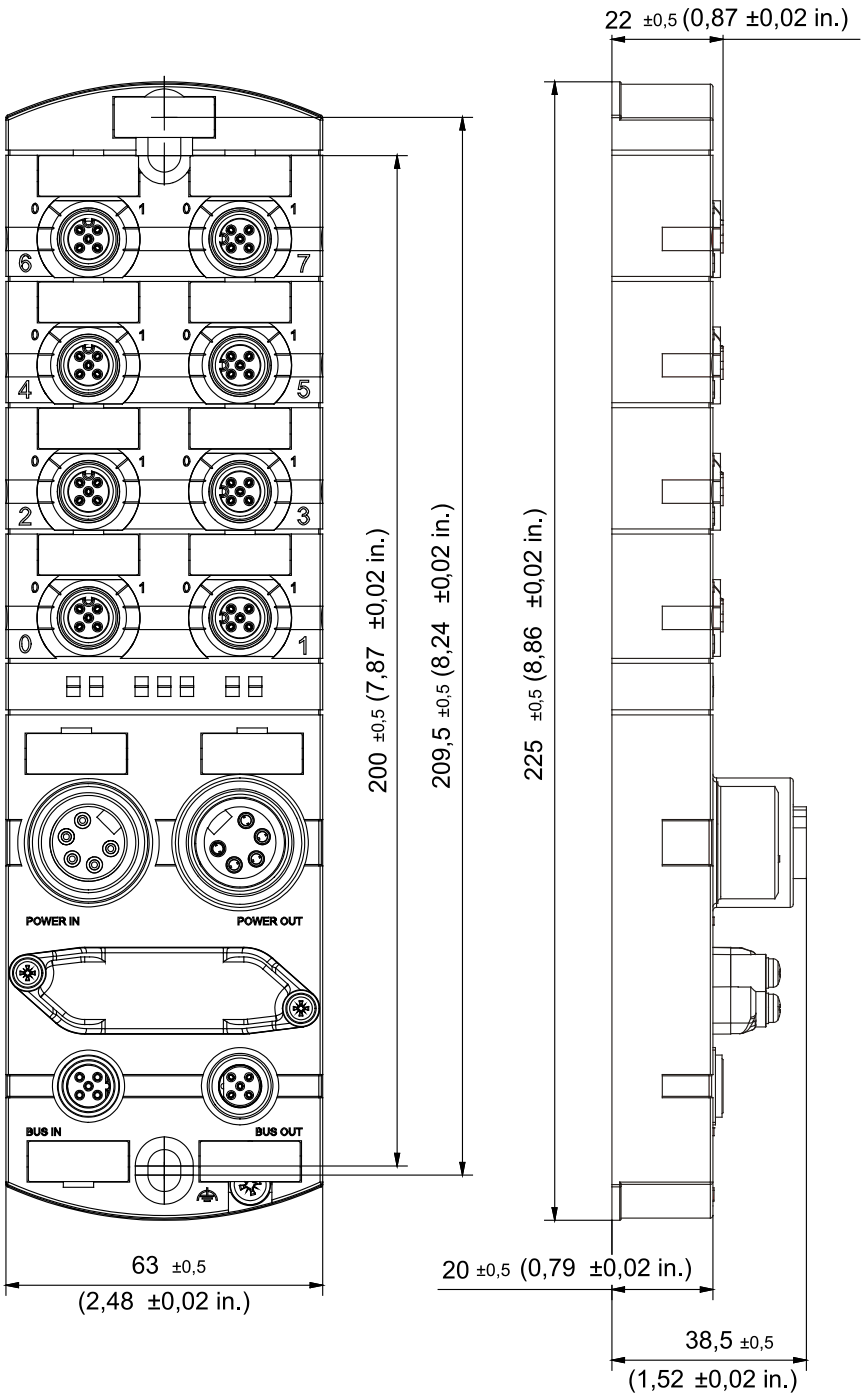


Fig. 2: Dimensioning

2.1.2 Spacing

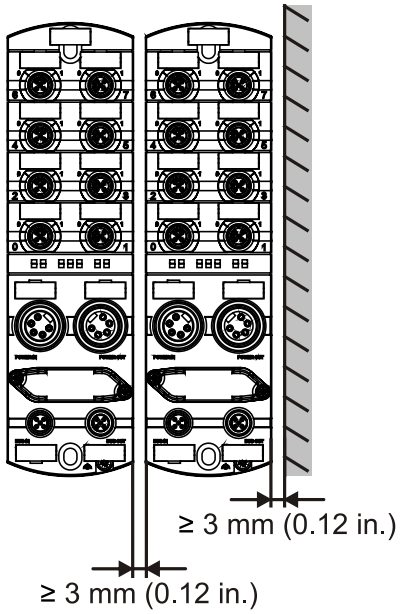


Fig. 3: Spacing

Angled connectors from Murrelektronik require a minimum spacing of 50 mm.

2.1.3 Mounting IMPACT67 Modules

The modules of the IMPACT67 Series can be fitted directly to an installation panel or a machine. The module features two mounting holes for this purpose.

Make sure that the mounting surface is flat and level to prevent mechanical stress in the module housing.

Attach the module using two 6 mm diameter screws and two washers as per DIN 433 T1/T2. The tightening torque is 3 Nm.

Function Ground

The FE connection is located at the bottom facing edge of the module housing. To ensure proper functioning in compliance with the EMC regulations specified in the datasheet, we recommend the use of our grounding strap. It is **not** included in the as-delivered state of the module. You must therefore purchase it separately.

Please refer to the chapter on Accessories.

Connect the PE terminal on the housing at low impedance to the function ground (refer to EMC information).

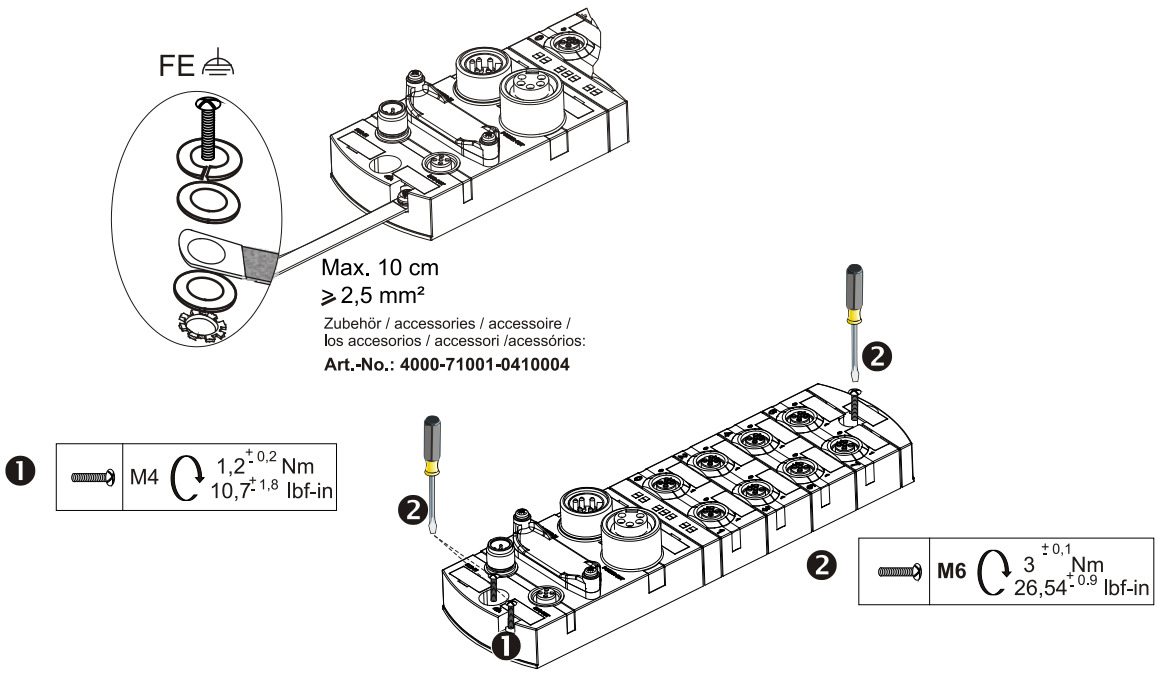


Fig. 4: Mounting

2.1.4 IP67 Protection

IP67 protection is only guaranteed when all sockets are wired up or provided with blank plugs.

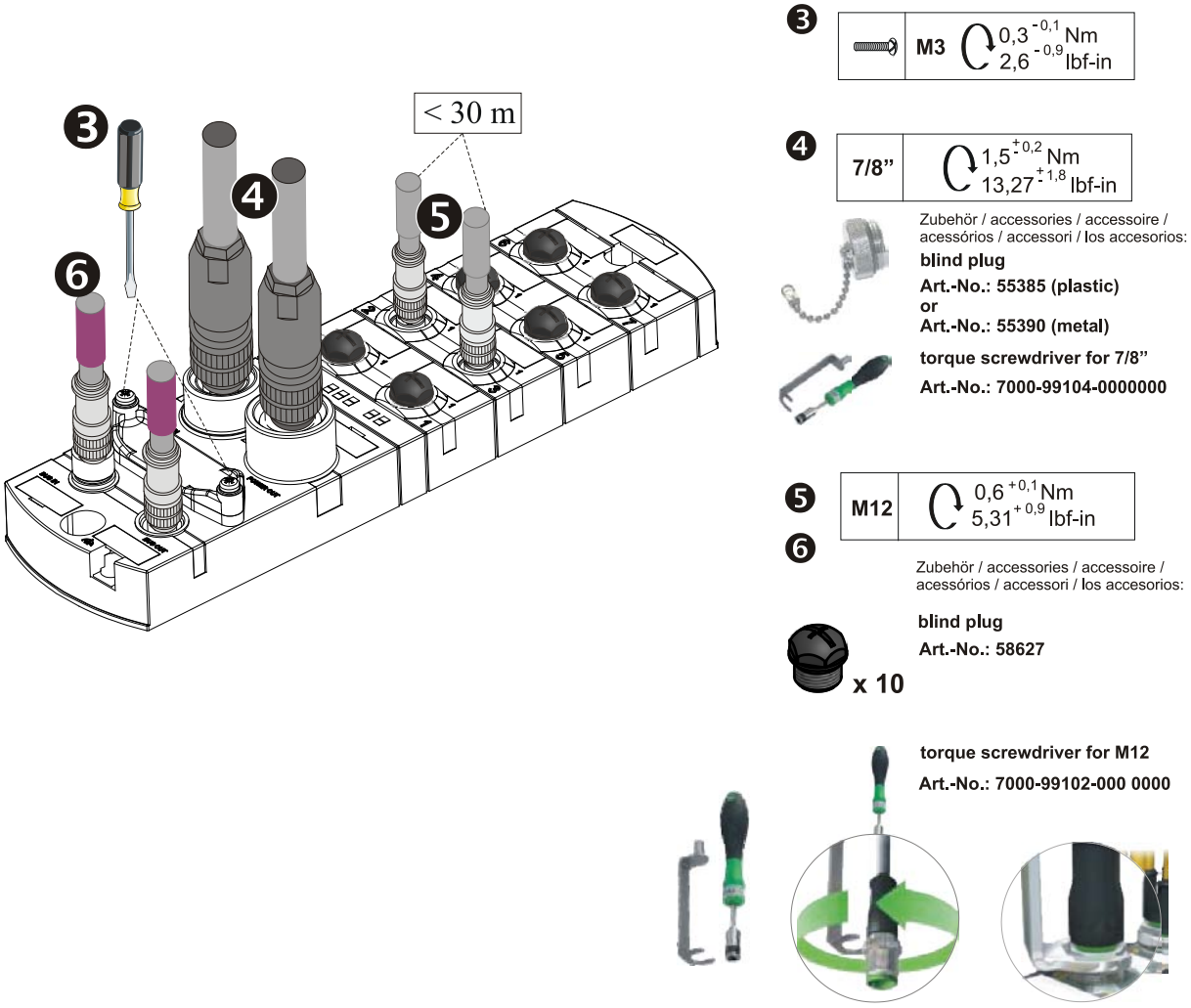


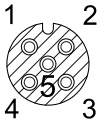
Fig. 5: Example of assembly for IP67

2.2 Connection Diagram of IMPACT67 PN

A

IMPACT67 PN DI16

M12



Pin 1	+24V Us / 0,2A
Pin 2	DI 10-17
Pin 3	0V
Pin 4	DI 00-07
Pin 5	⏚

A

IMPACT67 PN DI8 DO8

M12

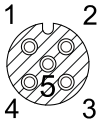
M12 0, 1, 2, 3		M12 4, 5, 6, 7	
Pin 1	n.c.	Pin 1	24V Us / 0,2A
Pin 2	DO 04-07	Pin 2	DI 04-07
Pin 3	0V	Pin 3	0V
Pin 4	DO 00-03	Pin 4	DI 00-03
Pin 5	⏚	Pin 5	⏚

DO: 8x 2A

A

IMPACT67 PN DO8

M12



M12 0, 2, 4, 6		M12 1, 3, 5, 7	
Pin 1	n.c.	Pin 1	n.c
Pin 2		Pin 2	n.c
Pin 3	0V	Pin 3	0V
Pin 4	DO 00,02, DO 04,06	Pin 4	DO 01,03, DO 05,07
Pin 5	⏚	Pin 5	⏚

DO: 8x 2A

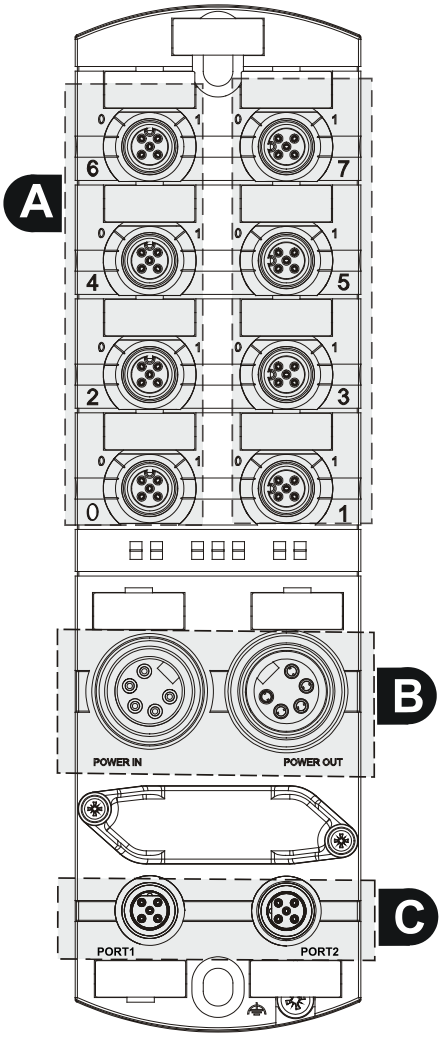
A

IMPACT67 PN DO16

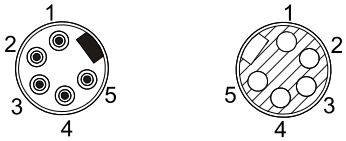
M12

Pin 1	n.c.
Pin 2	DO 10-17
Pin 3	0V
Pin 4	DO 00-07
Pin 5	⏚

DO: 16x 0,5A



B **POWER IN** **POWER OUT**



Pin 1	0V
Pin 2	0V
Pin 3	⏚
Pin 4	+24V U_S / max. 9 A
Pin 5	+24V U_A / max. 9 A

C **PORT1** **PORT2**

TD +	**Pin 1**	TD +
RD +	**Pin 2**	RD +
TD -	**Pin 3**	TD -
RD -	**Pin 4**	RD -
n.c.	**Pin 5**	n.c.
⏚	Gewinde Thread Filet Rosca Filetto Rosca	⏚

3. Configuration Notes

3.1 System Components

3.1.1 Product Designation Code

The designation format of IMPACT67 system components explains their function.

Examples:

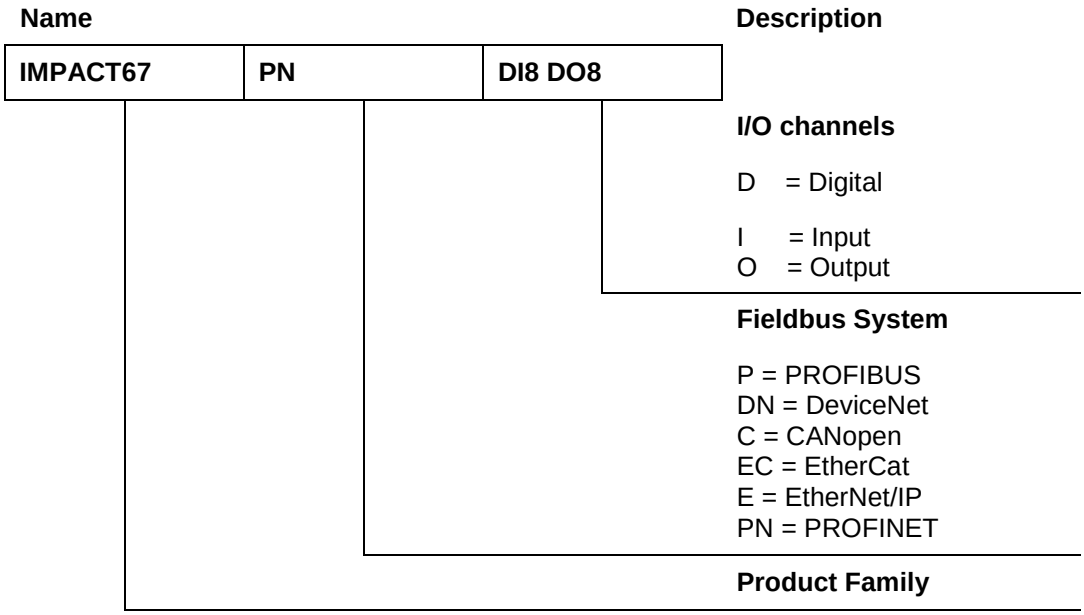


Fig. 6: Example of product designation

3.1.2 IMPACT67 Modules

The purpose of the IMPACT67 system is the decentralized routing of signals at the I/O level and the supply of this information over a Fieldbus network (e.g. PROFIBUS, CANopen, DeviceNet, EtherCAT, EtherNet/IP).

The module and I/O units are powered by a 5-pin power plug 7/8" (mini style).

Article Number	Description	
55091	IMPACT67 PN DI16	
55092	IMPACT67 PN DI8 DO8 (2A)	
55093	IMPACT67 PN DO8 (2A)	
55094	IMPACT67 PN DO16 (0,5A)	

Tab. 1: IMPACT67 PN Modules

3.1.3 Accessories

Most cables and connectors are available in angled style.

3.1.3.1 BUS Cables

PROFINET		
Article Number	**Description**	
	Straight connector / straight connector violet	Cable length
7000-44511-7980150		1.5 m
7000-44511-7980300		3 m
7000-44511-7980500		5 m
7000-44511-7980750		7.5 m
7000-44511-7981000		10 m

Tab. 2: PROFINET

PROFINET		
Article Number	**Description**	
	Straight connector with nonterminated wire end violet	Cable length
7000-14541-7980150		1.5 m
7000-14541-7980300		3 m
7000-14541-7980500		5 m
7000-14541-7980750		7.5 m
7000-14541-7981000		10 m

Tab. 3: PROFINET

PROFINET		
Article Number	**Description**	
	Straight connector / straight socket green	Cable length
7000-44511-7960150		1.5 m
7000-44511-7960300		3 m
7000-44511-7960500		5 m
7000-44511-7960750		7.5 m
7000-44511-7961000		10 m

Tab. 4: PROFINET

PROFINET		
Article Number	**Description**	
	Straight connector with nonterminated wire end green	Cable length
7000-14541-7960150		1.5 m
7000-14541-7960300		3 m
7000-14541-7960500		5 m
7000-14541-7960750		7.5 m
7000-14541-7961000		10 m

Tab. 5: PROFINET

3.1.3.2 POWER Cables

Power cable 7/8“		
Article Number	**Description**	
	Straight connector / straight socket	Cable length
7000-50021-9610030		0.3 m
7000-50021-9610060		0.6 m
7000-50021-9610100		1 m
7000-50021-9610150		1.5 m
7000-50021-9610200		2 m

Tab. 6: Power cable 7/8“

Power cable 7/8“		
Article Number	**Description**	
	Straight socket / with nonterminated wire end	Cable length
7000-78021-9610150		1.5 m
7000-78021-9610300		3 m
7000-78021-9610500		5 m
7000-78021-9610750		7,5
7000-78021-9611000		10 m

Tab. 7: Power cable 7/8“

3.1.3.3 I/O Cables

I/O		
Article Number	**Description**	
	Straight connector yellow with nonterminated wire end	Cable length
7000-12041-0250150		1.5 m
7000-12041-0250300		3 m
7000-12041-0250500		5 m
7000-12041-0250750		7.5 m
7000-12041-0251000		10 m

Tab. 8: I/O

The input/output cables are of course available in all shapes, colors, and combinations.

3.1.3.4 Valve Connector Combination Style A

- Contact spacing 18 mm
- Operating voltage 24 V AC/DC
- Operating current max. 4 A

Article Number	Description	
	M12 top connection	Cable length
7000-41501-2260000		110 mm
7000-41521-2260000		150 mm
7000-41541-2260000		200 mm
	M12 rear connection	Cable length
7000-41561-2260000		110 mm
7000-41581-2260000		150 mm
7000-41601-2260000		200 mm
Other system accessories on request		

Tab. 9: Valve connector combination Style A

3.1.3.5 Valve Connector Style A

- Contact spacing 18 mm
- Operating voltage 24 V AC/DC, pressure switch 24 V DC
- Operating current max. 4 A

Article Number	Description	
7000-41341-0000000	M12 top connection	LED yellow, protection circuit for valves
7000-41361-0000000		LED yellow/green for pressure switch
7000-41461-0000000	M12 rear connection	LED yellow, protection circuit for valves
7000-41481-0000000		LED yellow/green for pressure switch

Tab. 10: Valve connector Style A

We also offer a very wide product portfolio of sensors and actuators. From connectors, cables, adapters, through to special requests.

Please visit our online shop:

onlineshop.murrelektronik.com

3.1.3.6 Connector for Self-Connection

Article Number	Description
7000-14521-0000000	CAT5 Bus M12 connector D-coded, 4-pin, straight
7000-99051-0000000	CAT5 Bus RJ45 D-coded, 4-pin, straight IP20
7000-00000-7969999	Bus cable for PROFINET, 100 m collar
7000-78081-0000000	Power 7/8“ straight connector 5-pin, self-connecting
7000-78201-0000000	Power 7/8" socket straight 5-pin, self-connecting

Tab. 11: Connector for self-connection

3.1.3.7 Adapter

Article Number	Description	
7000-99052-0000000	Adapter M12 / RJ45, CAT 5, Socket /socket	

Tab. 12: Adapter

3.1.3.8 Blank Plug

Article Number	Description
7000-41241-0000000	M12 diagnostic adapter (for line monitoring to bridges)
58 627	M12 plastic plug (SP 10 pieces)
338155	Diagnosis blanking plug M12x1 (VP 1 pc.)
55390	7/8" screw plug, metal with chain (SP 1 piece)
55385	7/8" screw plug, plastic (SP 1 piece)

Tab. 13: Blank plug

3.1.3.9 Identification Labels

Article Number	Description
996067	IDENTIFICATION LABELS 20X8MM (SP 10 pieces)

Tab. 14: Identification labels

3.1.3.10 Grounding Strap

Article Number	Description
4000-71001-0410004	Grounding strap 4 mm² 100 mm for M4 (SP 1 piece)

Tab. 15: Grounding strap

3.1.3.11 Torque Wrench

Article Number	Description
7000-99102-0000000	Set of M12 torque wrenches (SP 1 piece)
7000-99104-0000000	Set of 7/8" torque wrenches (SP 1 piece)

Tab. 16: Torque wrench

3.1.3.12 MICO

- – Fire protection (EN 60950-1)
- – Operating voltage protection (EN 61131-2)
- – Operating state memory device (EN 61131-1)

Article Number	Description	Nominal operating branch-circuit current (full load)	
9000-41034-0100400	MICO 4.4 (4 channels)	each 4 A	
9000-41034-0100600	MICO 4.6 (4 channels)	each 6 A	
9000-41034-0401000	MICO 4.10 (4 channels)	each 10 A	
9000-41042-0100400	MICO 2.4 (2 channels)	each 4 A	
9000-41042-0100600	MICO 2.6 (2 channels)	each 6 A	
9000-41042-0401000	MICO 2.10 (2 channels)	each 10 A	

Tab. 17: Overview of MICO variants

Information on products and accessories are available in our catalog and our online shop at:

onlineshop.murrelektronik.com

3.2 Connecting the PROFINET Bus

Cables

A D-coded 4-pin M12 cable is required to connect PROFINET bus users.

We recommend the use of our preterminated PROFINET cables which are simple and reliable to install.

Please refer to the chapter on Accessories.

Pin assignment for bus terminal M12, 4-pin (D-coded)

socket PORT1 		socket PORT2
TD +	**Pin 1**	TD +
RD +	**Pin 2**	RD +
TD -	**Pin 3**	TD -
RD -	**Pin 4**	RD -
n.c.	**Pin 5**	n.c.
	Gewinde Thread Filet Rosca Filetto Rosca	

Tab. 18: Bus connector pin assignment

Make-up of PROFINET round cable

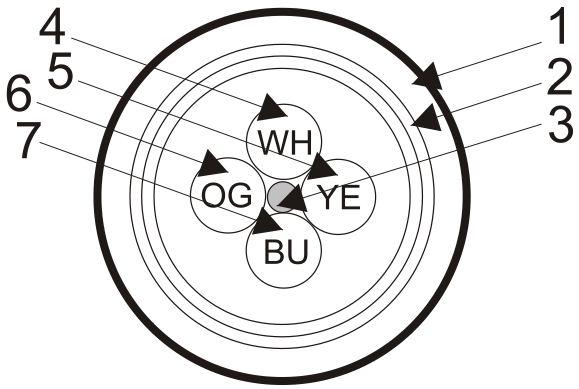


Fig. 7: PROFINET round cable

1	Sheath	4	bus conductor, white (RD+)
2	Line shield	5	bus conductor, yellow (TD+)
3	Central filler	6	bus conductor, orange (TD-)
		7	Bus conductor,, blue (RD-)

Cables (PROFINET Bus Cable)

violet or green

Conductors (PROFINET bus cable)

white	**- fieldbus system cable (RD+)**
blue	**- fieldbus system cable (RD-)**
yellow	**- fieldbus system cable (TD+)**
orange	**- fieldbus system cable (TD-)**

Connecting to IMPACT67

1. Mounting the IMPACT67 module.
2. Connect function ground to FE terminal on housing.
3. Connect incoming bus cables.
4. Connect any outgoing bus cable.

3.3 Power Supplies

We recommend the use of primary switched-mode power supplies in applications with the IMPACT67 and to supply the sensors and actuators.

IMPACT67 modules require a DC power supply in the range 18 to 30 V.

It is recommended to take different power supplies to power the sensors and actuators in order to achieve greater immunity from interference and decoupling.

System-related limit values regarding system power supply must be strictly observed if maximum functional safety and fault-free operation are to be ensured.

Always ensure that the system power, measured at the device furthest from the power supply, does not drop below 18 VDC.

A load current-related voltage drop in the power supply cable occurs due to the central power supply of IMPACT67 modules, including all their connected sensors.

In critical cases, voltage drop optimization is obtainable by changing the location of the power supply unit within the overall system and by using power supply cables with a larger conductor cross-section.

Calculating the required conductor cross-sections is dependent on installation-specific configuration data and is therefore not discussed in this manual.

The power supply module may be damaged if power supply is polarity-reversed. For this reason, we recommend the use of our preterminated 7/8" cables.

3.3.1.1 Connecting the Power Supply to the Module

The auxiliary power is required to power the actuators and sensors. The electronics of the IMPACT67 are powered from the sensor power supply.

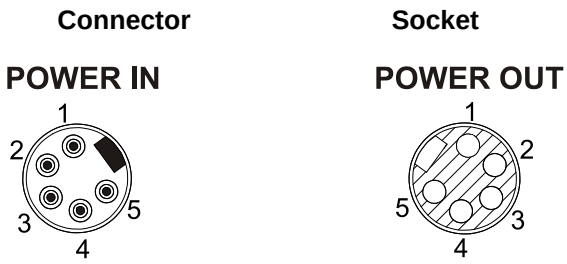
The 7/8“ connector is designed to carry a maximum current of 9 A per pin. This is taken into account when connecting the power supply to another circuit.

Power Supply Line

Module supply cables must have VDE approval and a maximum core cross-section of 1.5 mm². All further power supply line characteristics depend on individual applications and are not covered in this manual.

The maximum permitted core cross-section is 1.5 mm².

Pin assignment of 5-pin power plug 7/8" (mini style)



0V	**Pin 1**	0V
0V	**Pin 2**	0V
	Pin 3	
+24V U_S / max. 9 A	**Pin 4**	+24V U_S / max. 9 A
+24V U_A / max. 9 A	**Pin 5**	+24V U_A / max. 9 A

Tab. 19: Pin assignment of power plug 7/8" (mini style)

Cable assignment of 5-pin power cable

Conductors (power cable)

Black conductors 1	**0 V**
Black conductors 2	**0 V**
green/yellow	**FE**
Black conductors 3	**sensor and bus supply**
Black conductors 4	**actuator power supply**

Connection to IMPACT67

1. Mounting the IMPACT67 module.
2. Attach function ground cable to IMPACT67 module.
3. Connect sensor/actuator level.
4. Hook up bus connection.
5. Connect power supply.

Never switch off the sensor power supply (Pin 4) at the power supply connector in service and do not route via the emergency off circuits. Otherwise, the IMPACT67 module can no longer participate in bus communication. Therefore, the module electronics, the entire I/O section, and the sensors are powered via Pin 4.

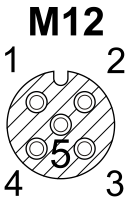
The actuator power supply (Pin 5) may be designed for EMERGENCY OFF circuits.

3.4 Connecting Sensors and Actuators

3.4.1 Connecting Sensors

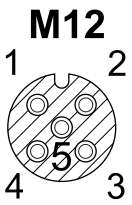
The table below depicts all the general pin assignments for the M12 socket slots

Pin 1	+ 24 V	Sensor supply
Pin 2	Function channel	Channel
Pin 3	0 V	Reference potential
Pin 4	Function channel	Channel
Pin 5	⏚	Function ground



Tab. 20: General pin assignment of M12 slots

3.4.1.1 IMPACT67 PN DI16



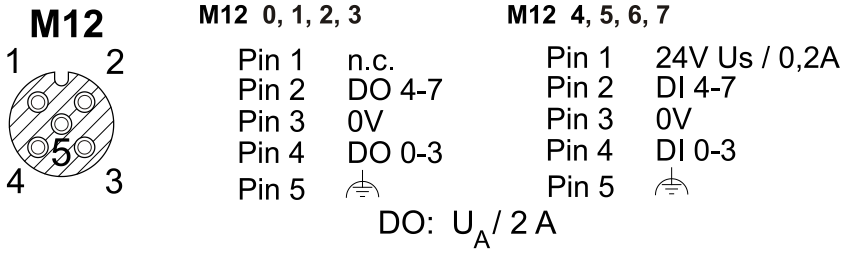
Pin 1 +24V Us / 0,2A
Pin 2 DI 10-17
Pin 3 0V
Pin 4 DI 0-7
Pin 5 ⏚

The table below depicts the assignment between M12 slots and I/O labels.

M12 slot	Channel (Pin 4)	Channel (Pin 2)
0	DI 00	DI 10
1	DI 01	DI 11
2	DI 02	DI 12
3	DI 03	DI 13
4	DI 04	DI 14
5	DI 05	DI 15
6	DI 06	DI 16
7	DI 07	DI 17

Tab. 21: M12 slots to I/O labels

3.4.1.2 IMPACT67 PN DI8 DO8



The table below depicts the assignment between M12 slots and I/O labels.

M12 slot	Channel (Pin 4)	Channel (Pin 2)
0	DO 00	DO 04
1	DO 01	DO 05
2	DO 02	DO 06
3	DO 03	DO 07
4	DI 00	DI 04
5	DI 01	DI 05
6	DI 02	DI 06
7	DI 03	DI 07

Tab. 22: M12 slots to I/O labels

3.4.1.3 Sensor Power Supply

Sensors can be powered directly via pins 1 (+24 V) and 3 (0 V) of the M12 sockets. The sensor power supply is protected per M12 slot. This protection is always self-resetting. The maximum current for the sensor power supply is 200 mA per M12 slot. Note the derating in the drawing below:

Derating Sensor Power Supply

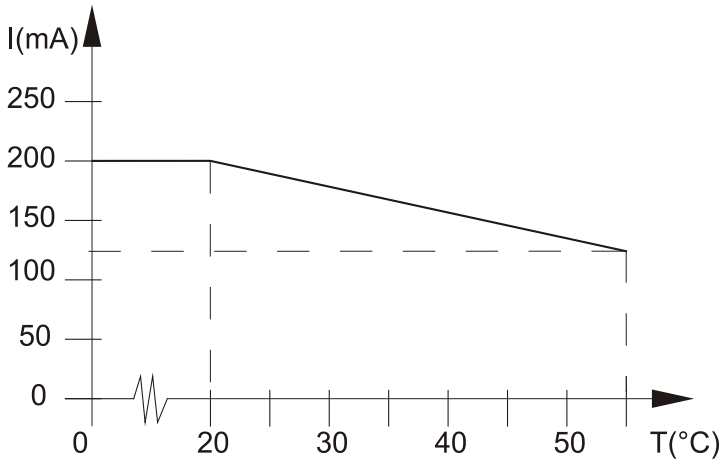


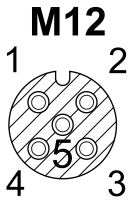
Fig. 8: Derating sensor power supply

IMPACT67 modules may be loaded to max. 200 mA per M12 slot (sensor current).

3.4.2 Connecting Actuators

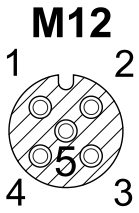
The table below depicts all the general pin assignments for the M12 socket slots

Pin 1	n.c.	not connected
Pin 2	Function channel	Channel
Pin 3	0 V	Reference potential
Pin 4	Function channel	Channel
Pin 5	⏚	Function ground



Tab. 23: General pin assignment of M12 slots

3.4.2.1 IMPACT67 PN DO16



Pin 1 n.c.
Pin 2 DO 10-17
Pin 3 0V
Pin 4 DO 0-7
Pin 5 ⏚

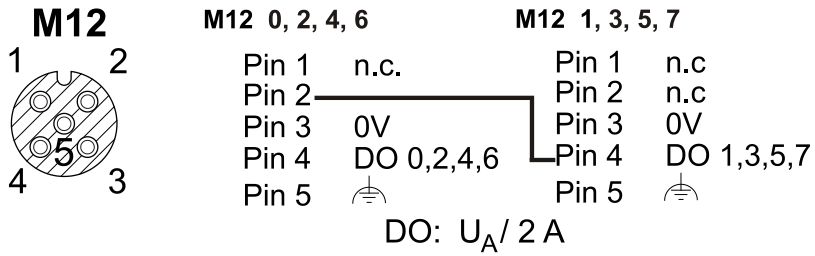
DO: U_A / 0,5 A

The table below depicts the assignment between M12 slots and I/O labels.

M12 slot	Channel (Pin 4)	Channel (Pin 2)
0	DO 00	DO 10
1	DO 01	DO 11
2	DO 02	DO 12
3	DO 03	DO 13
4	DO 04	DO 14
5	DO 05	DO 15
6	DO 06	DO 16
7	DO 07	DO 17

Tab. 24: M12 slots to I/O labels

3.4.2.2 IMPACT67 PN DO8



The table below depicts the assignment between M12 slots and I/O labels.

M12 slot	Channel (Pin 4)	Channel (Pin 2)
0	DO 00	DO 01
1	DO 01	-
2	DO 02	DO 03
3	DO 03	-
4	DO 04	DO 05
5	DO 05	-
6	DO 06	DO 07
7	DO 07	-

Tab. 25: M12 slots to I/O labels

3.4.2.3 Actuators

Each output of the DO8 and DI8/DO8 variants is loadable to max. 2 A.

Each output of the DO16 variant is loadable to max. 0.5 A.

The total current may not exceed 9 A due to the maximum current carrying capacity of the 7/8“ power connector.

The module may heat up depending on the load.

If an output channel detects an overload or a short-circuit, the output is shut down.

To reset the output, it must first be reset using the control software.

Outputs are reset by an actuator power supply reset.

In order to achieve rapid short-circuit cutoff times, we recommend not to exceed the following lengths:

max. 15 m feed line (POWER IN) 1.5 mm² and max. 1.5 m actuator line 0.75 mm²

max. 10 m feed line (POWER IN) 1.5 mm² and max. 3 m actuator line 0.75 mm²

3.5 Unused Connections

Unused sockets must be closed off with blank plugs. Otherwise, IP 67 protection is not guaranteed.

4. Startup

Then connect your IMPACT67 modules by means of an M12 PROFINET cable to an PROFINET-capable controller and connect your sensors and/or actuators using M12 cables.

Only then hook up the power supply using a 7/8“ power supply cable.

Configure your controller as described below using the example of a Siemens S7 controller.

Prior to setup, a competent system structure check of the field bus must be assured.

To start up, you require the latest version of the IMPACT67 GSD file.

4.1 GSD File

The GDS file in GSDML format is required to operate the devices described in this manual.

GSDML-Vx.x-Murrelektronik-IMPACT67-JJJJMMTT.xml

Import the GSD file to the appropriate configuration tool before starting up the device.

The GSD file is downloadable from the Murrelektronik website on the "Service >> Technical Data" page: www.murrelektronik.com.
Please also download the associated icon Impact67.bmp.

4.2 Configuration with S7 Hardware Manager

This chapter explains how to configure and parameterize an IMPACT67 module using the example of the HW configuration (hardware configuration software of the Simatic S7

Manager from Siemens).

4.2.1 General Information

Configuring the PROFINET device is necessary to define the I/O data quantity and reserve the addresses in the controller.

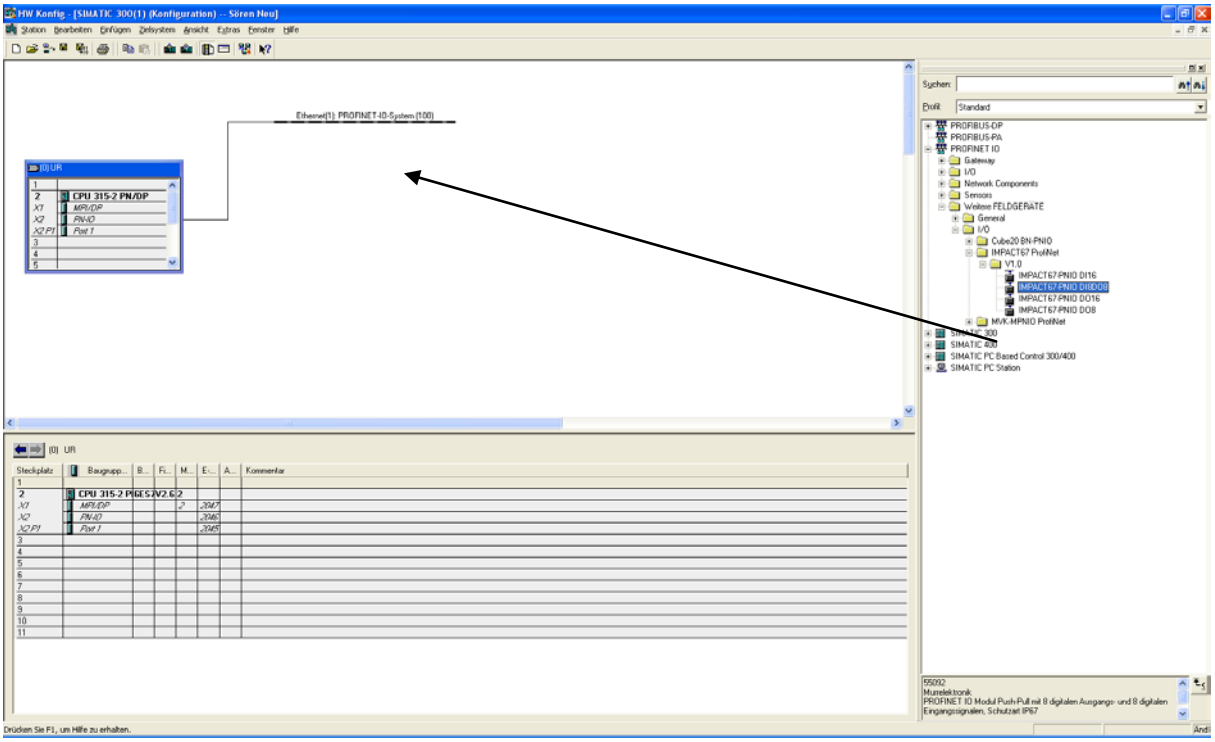
The IMPACT67 module is a physically compact device. However, in the PNIO system, it is treated as a modular system. This modular system comprises a "virtual" head module to which "virtual" useful data and "virtual" diagnostic modules are connected.

First add the head module to the virtual bus, just as in a construction kit. Head modules always have zero data length and their function acts as module identification and parameterization. They are also in direct connection with the Article Number of each IMPACT67 module.

A power supply module automatically follows each head module in Slot 1. The head module sends diagnostic messages to the power supplies.

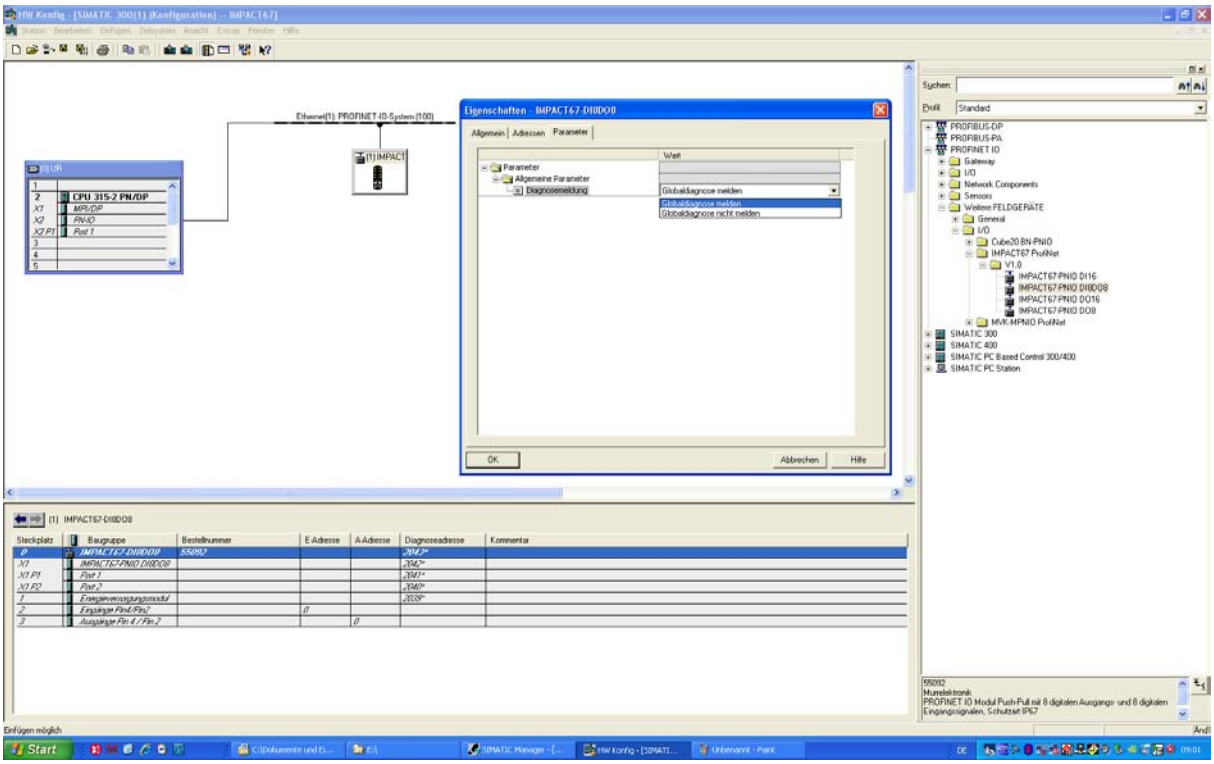
Then add the useful data modules. A separate address can be assigned to each of the useful data modules in the PLC process image.

4.2.2 Calibrating the IMPACT67



You can find the IMPACT67 under **PROFINET IO → "*Other Field Devices*" → "*I/O*"** in the Simatic Manager hardware catalog.

Mark the appropriate "***IMPACT67***" in the hardware catalog and drag the entry to the virtual PROFINET line while holding down the left mouse button.



After you add the required Impact67 to the PROFINET IO system, you can parameterize it. Parameterization takes place in Slot 0 via the virtual head module. Double-click to open the dialog box for module properties. Parameterize the module on the Parameters tab. For a detailed explanation of the meaning of these parameters, refer to Chapter 4.3 Parameterization.

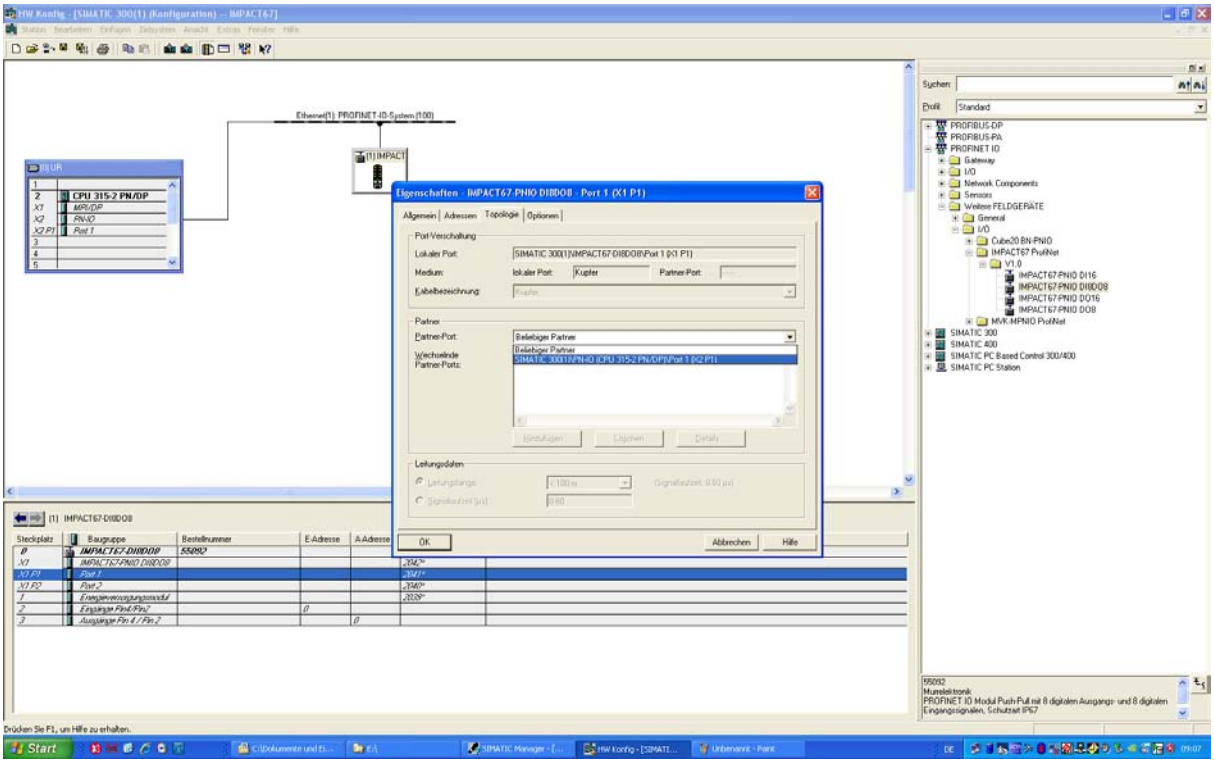
4.2.3 Setting the Topology

PROFINET offers a number of functions, diagnostic, and maintenance options based on the existing topology or utilizing knowledge of the topology. All IMPACT67 devices support the topology setting and automatic topology recognition by the Engineering Tool.

This section briefly explains how to set up the topology for IMPACT67 modules.

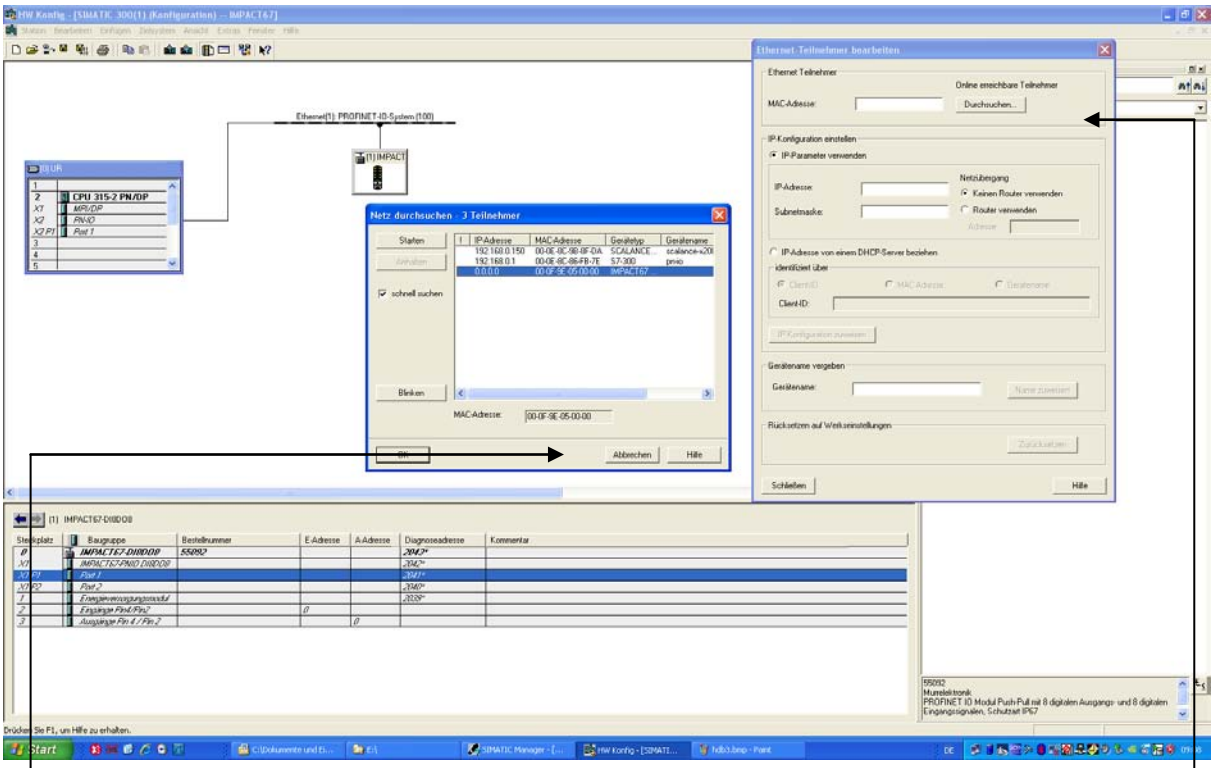
Setting up from connected adjacent devices is performed using Slots X1 P1 and X1 P2, which represent physical interfaces.

A list of possible ports of other devices in the project are located on the Topology tab under the "Partner Port" option.



4.2.4 Identifying Individual Devices in the Network

PNIO devices are identified by their MAC addresses and the appropriate device type. If you want to put several modules of the same type into operation, make sure you provide each with a definite unambiguous identification.



Use your configuration tool to scan and select all the modules in the network. Use the path below to search the network for reachable users in the HW configuration: **Target system → Ethernet → Edit Ethernet Users → Search**

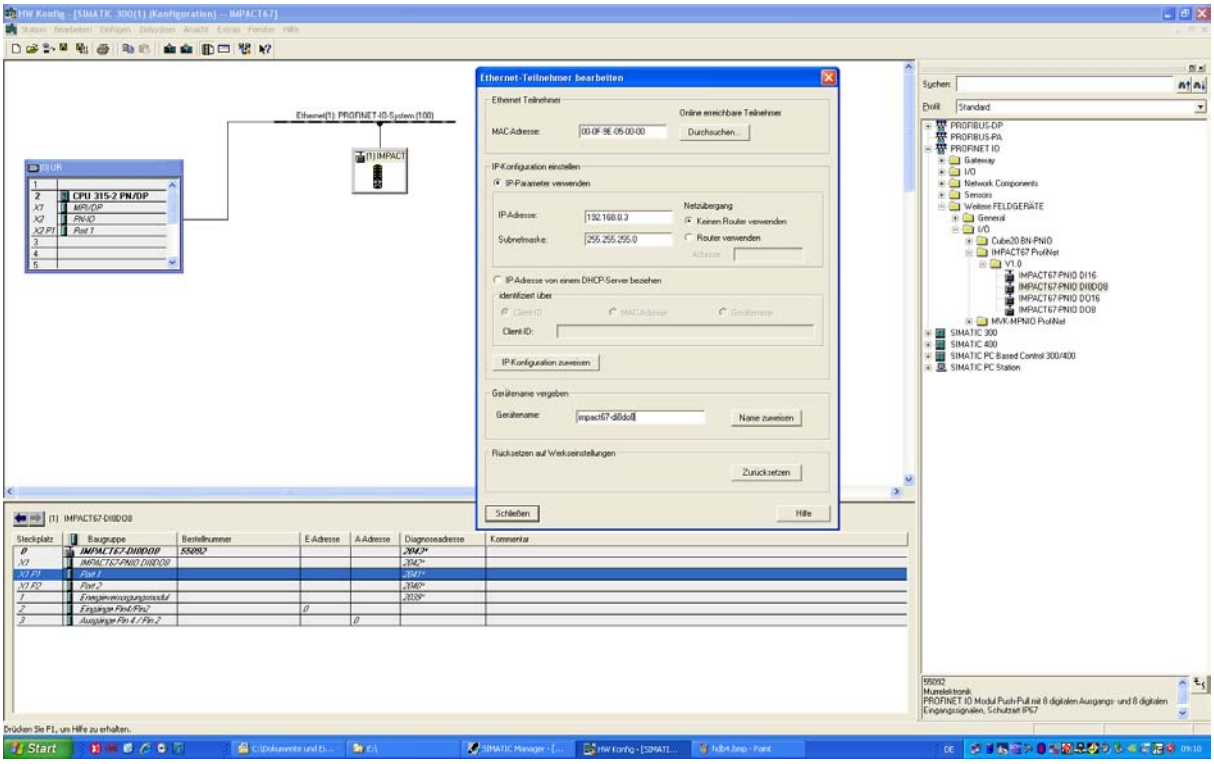
Identification takes place using the blink test. This test makes the LINK LED of the selected IMPACT67 device blink at a rate of 2 Hz. Mark an available device and select the **Blink** option.

The IMPACT67 has the following factory settings:

- MAC address: 00-0F-9E-xx-xx-xx
- IP address: 0.0.0.0
- Device type: IMPACT67
- Device name: (empty)

4.2.5 Issuing Device Names and IP Addresses

After you identify a module unambiguously, assign a device name to it. The IP address is issued automatically by the PNIO controller via DCP.



The Simatic S7 Manager then shows you the data detected from the IMPACT67. Then set the required IP address and the subnet mask for use. Finally click on "***Assign IP Configuration***". Alternatively, if you want to select the IP address automatically by DHCP Server, mark the suboption accordingly.

With PROFINET IO, it is absolutely necessary to award a unique name for each device.

The address and name resolution is only regulated using the name that is stored in a remanent memory

in the device.

After you have entered a name, please click on "***Assign Name"***.

The "Reset to Factory Settings" function clears the previous settings and restores the defaults.

IP address: 0.0.0.0

Device name: (empty)

4.3 Parameterization

This chapter explains the parameterization options.

	Parameters	Description
1	Signal / do not signal global diagnostics	Activates / deactivates all module diagnostics.

Tab. 26: Parameters

4.4 Saving and Translating

When you have configured all the modules, you can save and translate the configuration. After you have transferred the application to the controller, the configuration and parameterization features are completed.

5. Mapping I/O Data

5.1 Byte Distribution

Header modules	Number of output bytes	Number of input bytes	
		I/O	Diagnos-tic
IMPACT67 PN DI16, 55091	0	2 bytes	1 byte
IMPACT67 PN DI8/DO8, 55092	1 byte	1 byte	3 bytes
IMPACT67 PN DO8, 55093	1 byte	0	2 bytes
IMPACT67 PN DO16, 55094	2 bytes	0	3 bytes

5.2 Relationship between Channel Number and Pin/Socket

Based on the channel number, you can define the socket and the associated pin. Example: Channel number is 12, this corresponds to Pin 2 (x=1) of Socket No. 2 (Y=2).

Channel number = XY	X	Y
X = 0	Pin 4	
X = 1	Pin 2	
Y = 0 to (number of sockets)		Number of sockets

5.3 Bit Assignment

5.3.1 Bit assignment for DO8 (Art.No.: 55093) / DI16 (Art.No.: 55091) / DO16 (Art.No.: 55094)

Bit assignment Byte 0: relevant for DO8, DI16, DO16

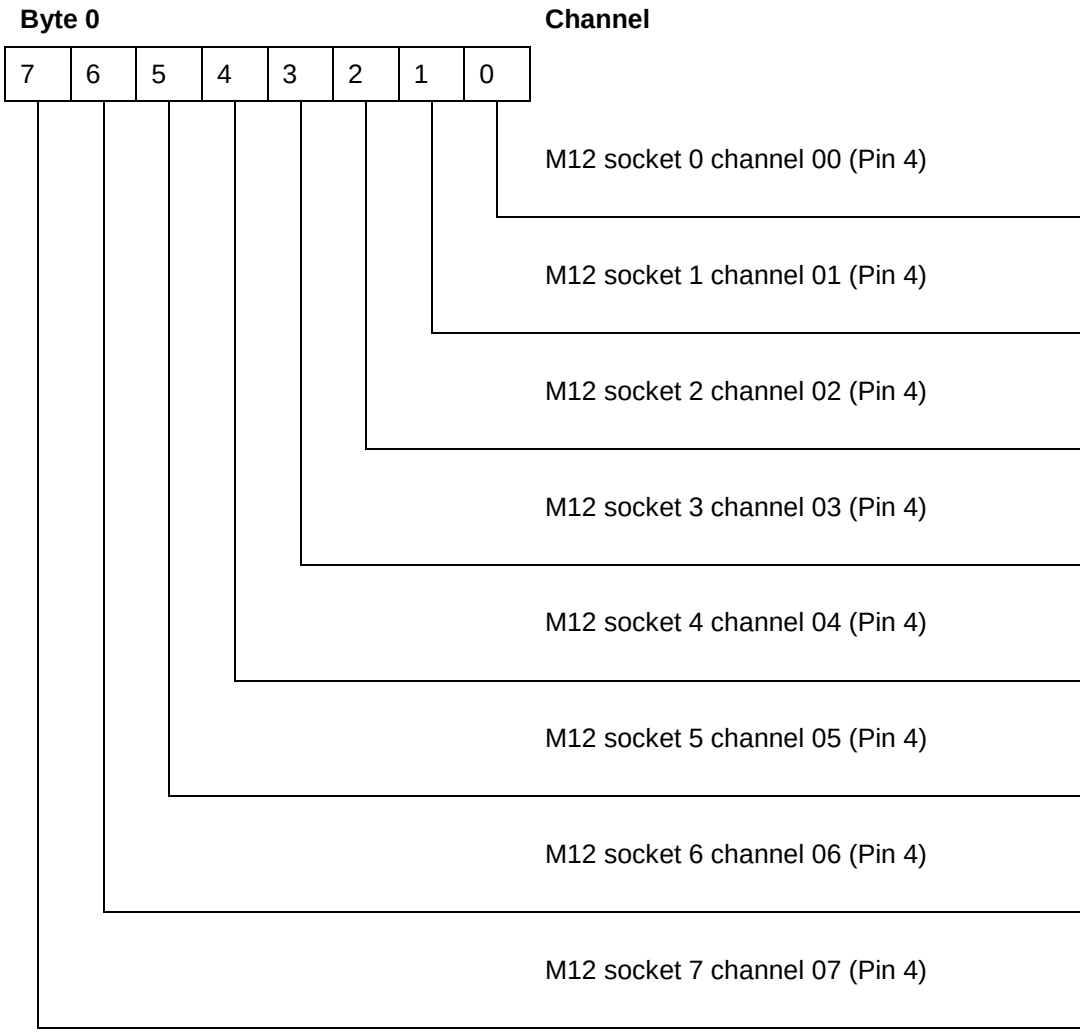


Fig. 9: Bit assignment Byte 0: relevant for DO8, DI16, DO16

Bit assignment Byte 1: relevant for DI16, DO16

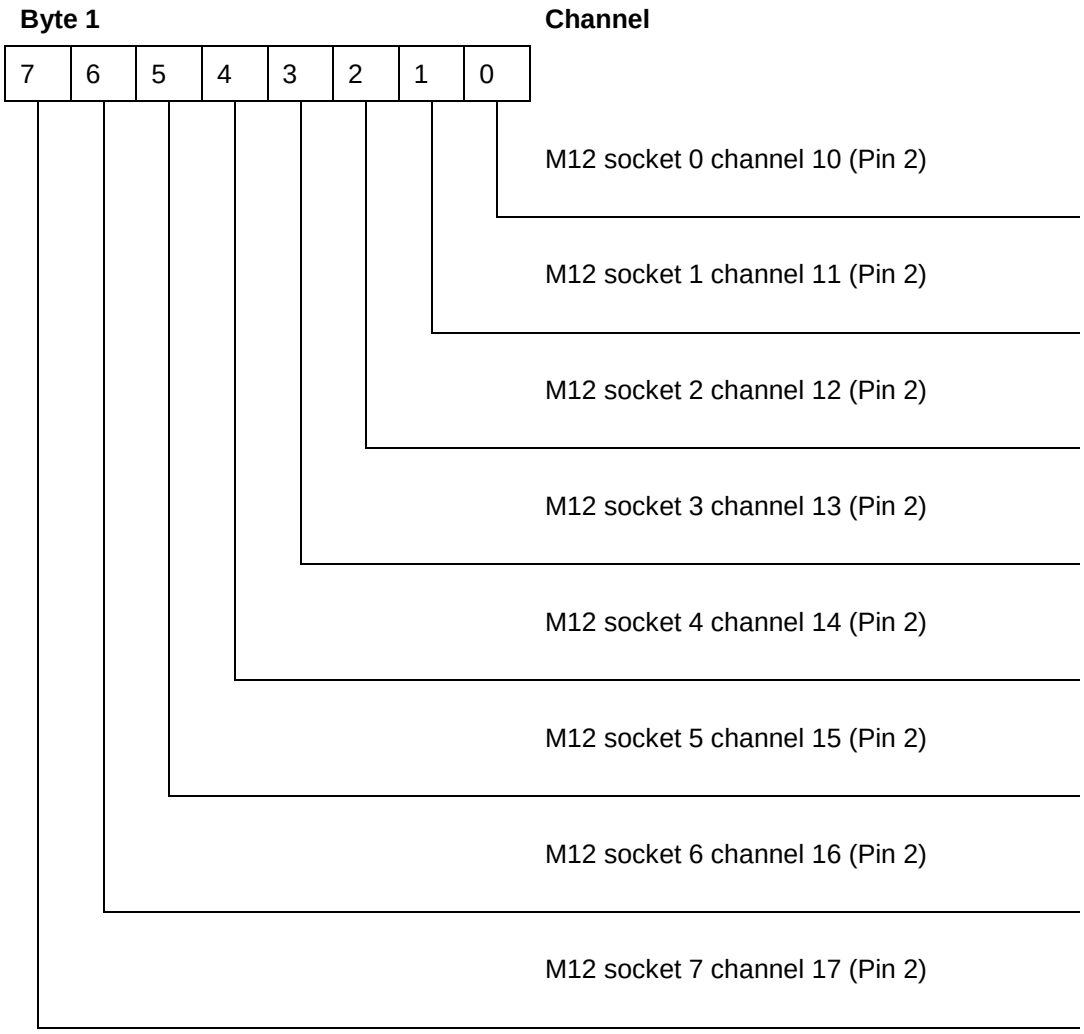


Fig. 10: Bit assignment Byte 1: relevant for DO16, DI16

5.3.2 Bit assignment for DI8 DO8 (Art.No.: 55092)

Bit assignment Byte 0: Outputs

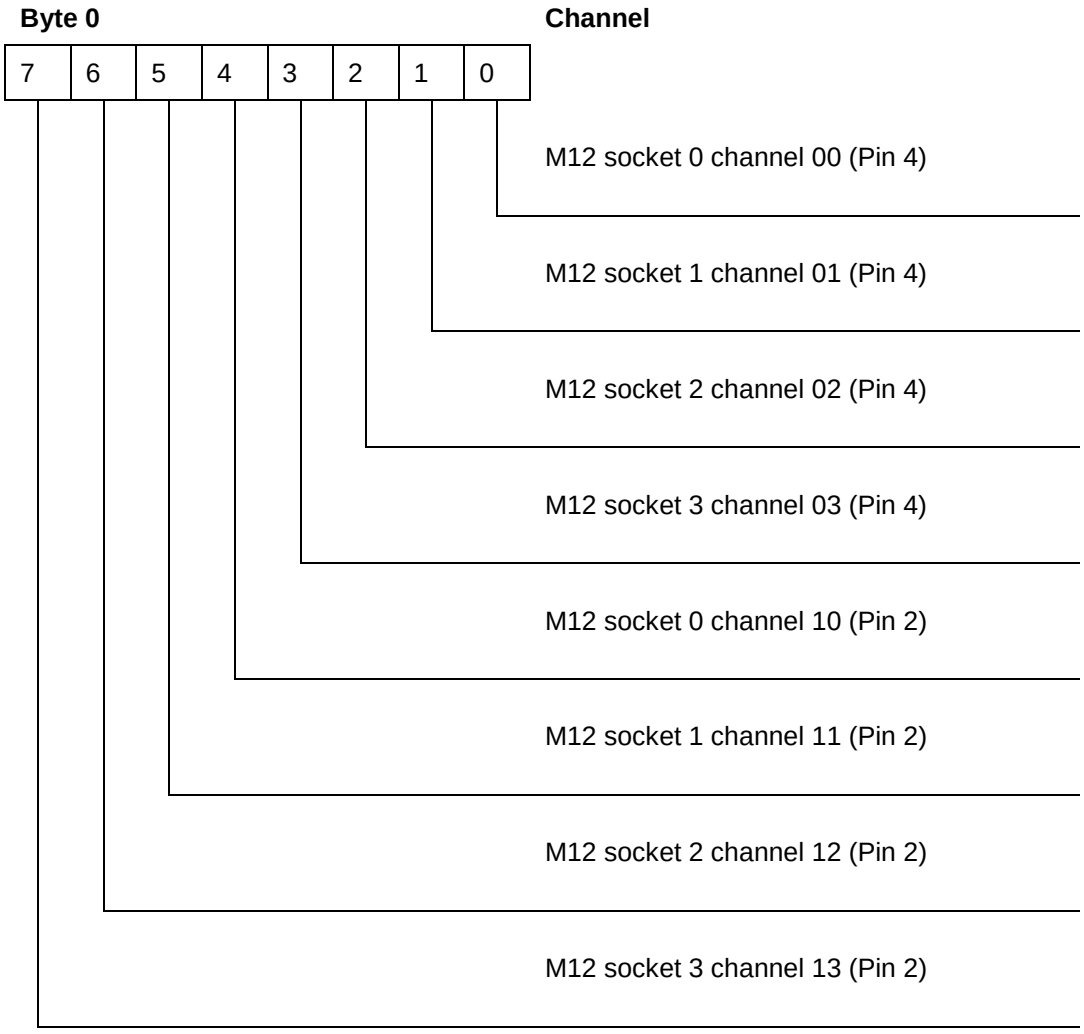


Fig. 11: Bit assignment Byte 0: Outputs

Bit assignment Byte 1: Inputs

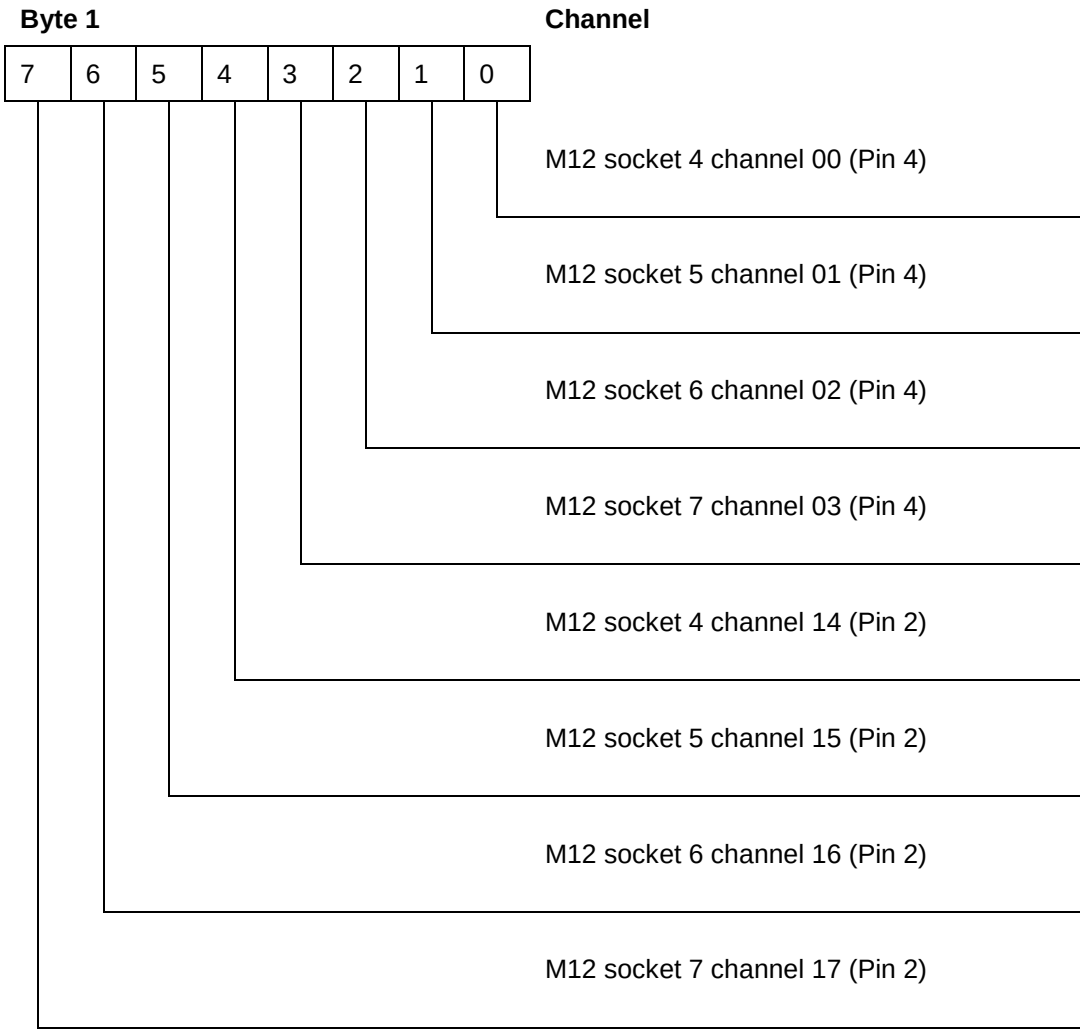


Fig. 12: Bit assignment Byte 1: Inputs

6. Diagnostics

Diagnostic information is an important basis for easy setup and quick troubleshooting.

Clear information from the I/O module and its connected periphery components, such as sensors and actuators, identify, rectify, and therefore minimize downtimes.

6.1 LED Displays

All IMPACT67 modules have separate and clearly arranged displays for bus status, device status, and I/O status displays. These displays are located on the front of the device.

6.1.1 Bus and Device Status LEDs

The LEDs on the front of the module are clearly marked for identification. Display is provided by LEDs that light up permanently or flash. The figure below depicts LED layout and the table lists the functions.

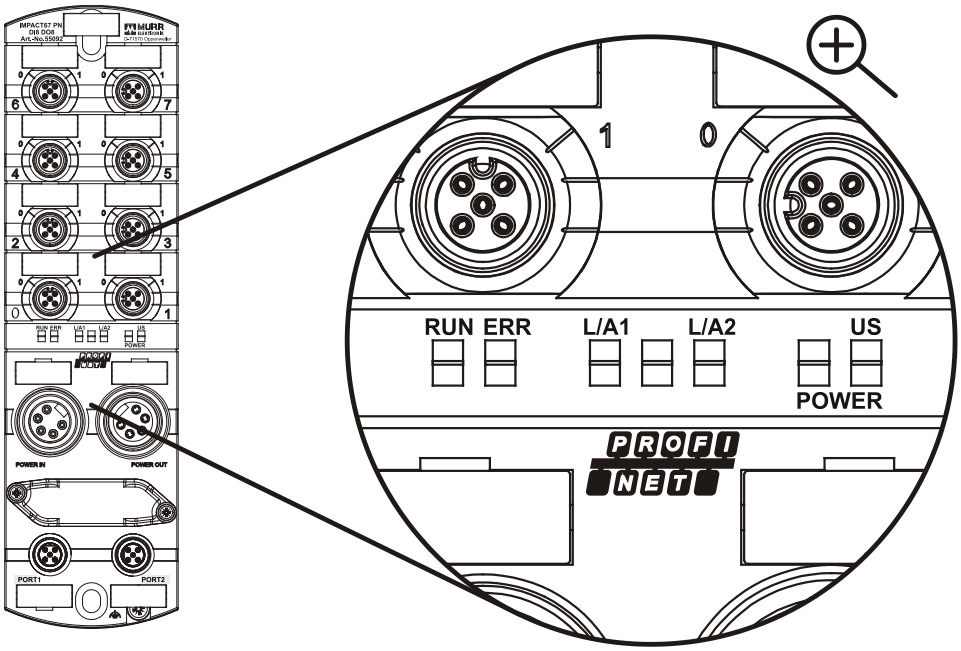


Fig. 13: Bus and device status LEDs on the module front panel

When the IMPACT67 module is supplied with power, the device starts with an automatic self-test which takes about 2 seconds.

Bus status LEDs on module front panel

LED Designation	LED Display	Response	Meaning
RUN		off	Device is off
RUN		green	Operational, device in service
RUN		green flashing	No connection to controller
ERR		off	Device operates faultfree
ERR		red	Parameterization error
L/A		green	Device detected a LINK
L/A		Green / yellow blinking	LINK and Activity present (yellow blinking is normally perceived as permanent AN)

Tab. 27: Bus status LEDs on module front panel

Device status LEDs on the module front panel

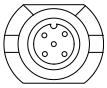
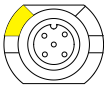
LED Description	LED Display	Response	Status	Meaning
US POWER (red/green)		off	No voltage	Failure of module and sensor power supply
		green	voltage applied	Module and sensor power supply applied
		red	Undervoltage	Module and sensor power supply undervoltage
UA POWER (red/green)		off	No voltage	Failure of actuator power supply
		green	voltage applied	Actuator supply OK
		red	Undervoltage	Undervoltage, actuator power supply

Tab. 28: Device status LEDs on the module front panel

6.1.2 I/O Status LEDs at M12 Slots

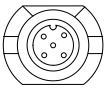
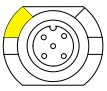
Each input and output is assigned a separate status display They are labeled with '00 to 07' and '10 to 17'. The displays are located directly next to the corresponding M12 socket. This makes it easy to identify the status of peripheral components, such as sensors and actuators.

LED Display of Digital Inputs

Input with NO Contact Function	Voltage at Input	Logic Value	LED Display	
	0 V	0		off
	24 V	1		yellow

Tab. 29: LED display of digital inputs

LED Display of Digital Outputs

Output	Logic Value	Voltage at Output	LED Display	
	0	0 V		off
	1	24 V		yellow

Tab. 30: LED display of digital outputs

6.1.3 LED Display for Diagnostics

6.1.3.1 IMPACT67 DI16 Modules

Error	LED at M12 Socket		LED Designation
	Socket No. x		U_S
	Channel 0x	Channel 1x	
Module/sensor power supply undervoltage			red
Short-circuit (sensor supply)	both red		

Tab. 31: LED display for diagnostics

6.1.3.2 IMPACT67 DI8 DO8 Modules

Error	LED at M12 Socket		LED Designation	
	Socket No. x		U_A	U_S
	Channel 0x	Channel 1x		
Module/sensor power supply undervoltage				red
Actuator power supply undervoltage			red	
No actuator supply			off	
Actuator short-circuit	red	red		
Short-circuit (sensor supply)	both red			

Tab. 32: LED display for diagnostics

6.1.3.3 IMPACT67 DO8 Modules

Error	LED at M12 Socket		LED Designation	
	Socket No. x		U_A	U_S
	Channel 0x	Channel 1x		
Module/sensor power supply undervoltage				red
Actuator power supply undervoltage			red	
No actuator supply			off	
Actuator short-circuit	red			

Tab. 33: LED display for diagnostics

6.1.3.4 IMPACT67 DO16 Modules

Error	LED at M12 Socket		LED Designation	
	Socket No. x		U_A	U_S
	Channel 0x	Channel 1x		
Module/sensor power supply undervoltage				red
Actuator power supply undervoltage			red	
No actuator supply			off	
Actuator short-circuit	red	red		

Tab. 34: LED display for diagnostics

6.2 Module / Sensor Power Supply

6.2.1 Undervoltage

There are two levels of undervoltage detection:

1. Us < 18 V : In this case, the module is still working but:

- The POWER - Us LED lights up red
- the respective diagnostic is transferred via the bus.

2. Us < 1.5 V : In this case, the device switches off and bus communication runs until Us < 6V

6.3 Actuator Power Supply

6.3.1 Undervoltage

There are two levels of undervoltage detection:

1. U_A < 18 V : In this case, the module is still working but:

- The POWER U_A LED lights up red
- The respective diagnostic data are transferred to the scanner

2. U_A < 13.5 V : In this case, the outputs are not longer functional.

- The POWER U_A LED goes out
- All outputs are reset to 0

6.4 Sensor Power Supply

Power supply for the sensors is provided at the M12 sockets between pin 1 (+24V) and Pin 3 (0V).

6.4.1 Short-Circuit or Overload

The sensor power supply is protected by a self-resetting multifuse for each M12 socket. The maximum current draw for the sensor power supply is 200 mA per M12 slot. Note the derating in the drawing below:

Derating Sensor Power Supply

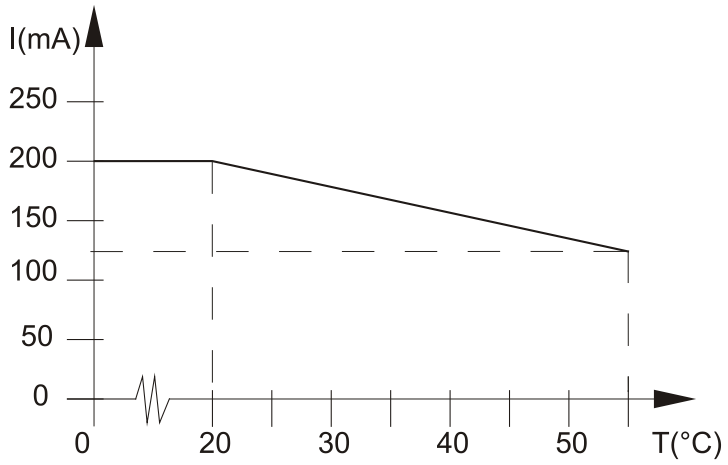


Fig. 14: Derating sensor power supply

In the event of a short-circuit or overload in the sensor supply, the following symptoms are observed on the IMPACT67 module:

- The diagnostic LEDs light up red on the associated M12 socket.
- The respective diagnostic data are transferred over the bus to the master.
- All other inputs function correctly.

When an overload or short-circuit is rectified or the sensor supply is connected, the LEDs and diagnostic data are reset.

6.5 Outputs (Actuators)

6.5.1 Short-Circuit or Overload

In the event of an output short-circuit or overload, the following symptoms are observed on the IMPACT67 module:

- The diagnostic LEDs light up red on the associated M12 socket
- The output status LED extinguishes
- The respective diagnostic data are transferred over the bus to the master.

In order to reactivate an output after a short circuit or overload has been corrected, the following procedure must be observed:

1. The output must first be set to “0”
2. and then to “1” again

Outputs are reset by an actuator power supply reset.

6.6 Diagnostics via the Fieldbus

The following diagnostics are reported:

- Sensor short-circuit group signal
- Actuator shutdown by channel and group signal
- Module / sensor power supply undervoltage (The power supply U_S is lower than 18V)
- Actuator power supply undervoltage (the power supply U_A is lower than 18 V)

The group diagnosis consists of one byte. The corresponding bit for the error is set when the error occurs and is deleted as soon as the error is rectified.

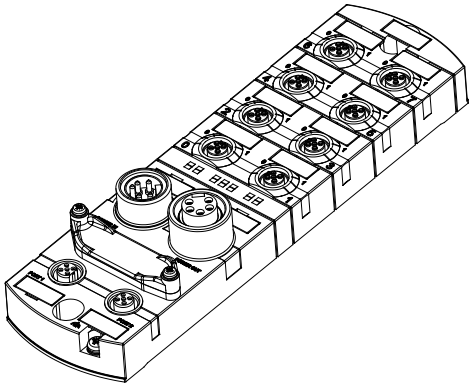
7. Technical Data

7.1 Art. No. 55091 IMPACT67 PN DI16

General

PROFINET I/O Device IP67

with 16 inputs



[M12 socket, Pin 4] → 8 inputs

[M12 socket, Pin 2] → 8 inputs

EMC

EN 61000-4-2 ESD .....: Contact ± 4 kV, air ± 8 kV
EN 61000-4-3 RF-Field .....: 10 V/m
EN 61000-4-4 Burst .....: ± 2 kV
EN 61000-4-5 Surge .....: asym./symm. ± 500 V (DC net input)
..... asym. ± 1 kV (Signal connections)
EN 61000-4-6 HF-asymmetric .....: 10 V
EN 55011 Interference field strength .....: QP 40 dBµV/m (30 - 230 MHz)
..... QP 47 dBµV/m (230 - 1000 MHz) (class A)

Ambient Conditions

Operating temperature .....: 0°C ... +55°C
Storage temperature.....: -25°C … +70°C
Enclosure type according to IEC 60529 .....: IP 67

Mechanical Ambient Conditions

Oscillation according to EN 60068 Part 2-6.....: 5 - 60 Hz: constant amplitude 0,35 mm,
..... 60 – 150 Hz: constant acceleration 5 g
Shock according to EN 60068 Part 2-27 .....: Amplitude 15 g, 11 ms duration

Miscellaneous

Dimensions (L × W × H).....: 225 × 63 × 39 mm
Attachment distance .....: 208 mm
Weight .....: approx. 420 g

Bus Data

Transfer protocol .....: PROFINET I/O
Transfer rates .....: 100 MBit/s
Addressing .....: via DCP
Cycle time.....: 2 ms

Connection Possibilities

Supply cable .....: 2 × connector 7/8" female / male connector
Data cable .....: 2 × M12 connector 5-pin
.....: (male connector, D-coded)
Inputs .....: 8 × 5-pin M12 connector
Maximum length of input cable.....: < 30 m

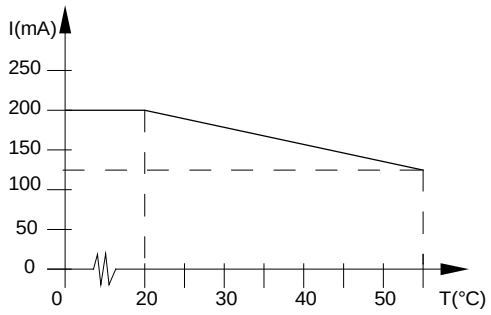
Power Supply

Voltage U_s over 7/8” power in connector.....: 24 VDC
Voltage U_s range .....: 18 – 30 VDC
Sensor supply 7/8” power in connector .....: max. 9 A
Current consumption (without In-/Output).....: <= 130 mA

Inputs

Number of inputs .....: 16
Input characteristics.....: EN 61131-2 Type 2
Supply for sensors .....: max. 200 mA per socket
Short circuit protection for sensors .....: Multifuse,
..... up to 100 mA load: automatic startup
..... from 100 mA load: a reset is required
Multi-fuse reaction time (time to trip) .....: 1s at IK >= 1 A and 23 °C

Derating Supply for Sensors

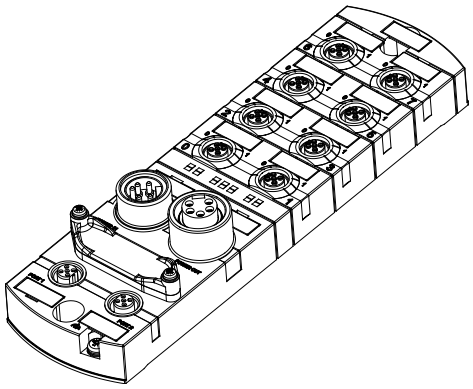


7.2 Art. No. 55092 IMPACT67 PN DI8 DO8

General

PROFINET I/O Device IP67

with 8 inputs and 8 outputs



[M12 socket 4, 5, 6, 7; Pin 4 and Pin 2] → 8 inputs

[M12 socket 0, 1, 2, 3; Pin 4 and Pin 2] → 8 outputs

EMC

EN 61000-4-2 ESD .....: Contact ± 4 kV, air ± 8 kV
EN 61000-4-3 RF-Field .....: 10 V/m
EN 61000-4-4 Burst .....: ± 2 kV
EN 61000-4-5 Surge .....: asym./symm. ± 500 V (DC net input)
..... asym. ± 1 kV (Signal connections)
EN 61000-4-6 HF-asymmetric .....: 10 V
EN 55011 Interference field strength .....: QP 40 dBµV/m (30 - 230 MHz)
..... QP 47 dBµV/m (230 - 1000 MHz) (class A)

Ambient Conditions

Operating temperature .....: 0°C ... +55°C
Storage temperature.....: -25°C … +70°C
Enclosure type according to IEC 60529 .....: IP 67

Mechanical Ambient Conditions

Oscillation according to EN 60068 Part 2-6.....: 5 - 60 Hz: constant amplitude 0.35 mm,
..... 60 – 150 Hz: constant acceleration 5 g
Shock according to EN 60068 Part 2-27 .....: Amplitude 15 g, 11 ms duration

Miscellaneous

Dimensions (L × W × H).....: 225 × 63 × 39 mm
Attachment distance .....: 208 mm
Weight .....: approx. 420 g

Bus Data

Transfer protocol .....: PROFINET I/O
Transfer rates .....: 100 MBit/s
Addressing .....: via DCP
Cycle time.....: 2 ms

Connection Possibilities

Supply cable .....: 2 × connector 7/8" female / male connector
Data cable .....: 2 × M12 connector 4-pin (male connector, D-coded)
Inputs .....: 4 × 5-pin M12 connector
Maximum length of input cable.....: < 30 m
Outputs .....: 4 × 5-pin M12 connector
Maximum length of output cable.....: with 0.75 mm² max. 10 m
.....: with 0.34 mm² max. 5 m

Power Supply

Voltage U_s / U_a over 7/8” power in connector.....: 24 VDC
Voltage U_s / U_a range.....: 18 – 30 VDC
Actuator supply 7/8” power in connector .....: max. 9 A
Sensor supply 7/8” power in connector .....: max. 9 A
Current consumption U_s (without In-/Output).....: <= 130 mA

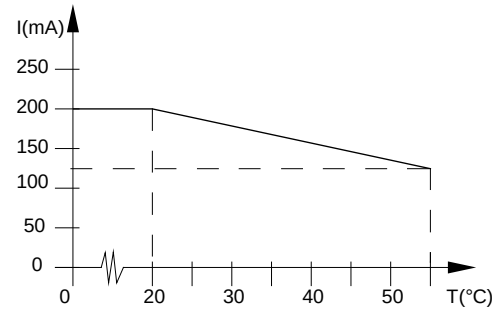
Outputs

Number of outputs .....: 8
Actuator current load .....: approx. 2 A per actuator
Switching frequency .....: approx. 50 Hz 50% duty ratio
Switching frequency inductive load .....: approx. 10 Hz 50% duty ratio
Lamp load.....: max. 40 W

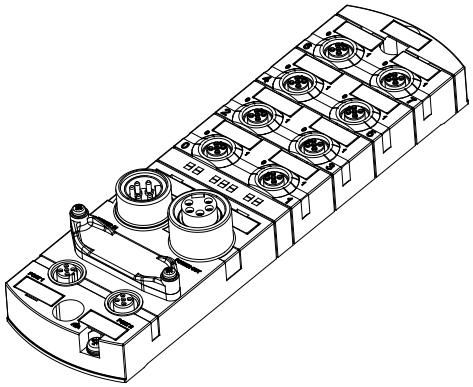
Inputs

Number of inputs.....: 8
Input characteristics.....: EN 61131-2, Typ 2
Supply for sensors .....: max. 200 mA per socket
Short circuit protection for sensors .....: Multifuse,
..... up to 100 mA load: automatic startup
..... from 100 mA load: a reset is required
Multi-fuse reaction time (time to trip) .....: 1s at IK >= 1 A and 23 °C

Derating Supply for Sensors



7.3 Art. No. 55093 IMPACT67 PN DO8



General

PROFINET I/O Device IP67

with 8 outputs

[M12 socket, Pin 4] → 8 outputs

EMC

EN 61000-4-2 ESD .....: Contact ± 4 kV, air ± 8 kV
EN 61000-4-3 RF-Field .....: 10 V/m
EN 61000-4-4 Burst .....: ± 2 kV
EN 61000-4-5 Surge .....: asym./symm. ± 500 V (DC net input)
..... asym. ± 1 kV (Signal connections)
EN 61000-4-6 HF-asymmetric .....: 10 V
EN 55011 Interference field strength .....: QP 40 dBµV/m (30 - 230 MHz)
..... QP 47 dBµV/m (230 - 1000 MHz) (class A)

Ambient Conditions

Operating temperature .....: 0°C ... +55°C
Storage temperature.....: -25°C … +70°C
Enclosure type according to IEC 60529 .....: IP 67

Mechanical Ambient Conditions

Oscillation according to EN 60068 Part 2-6.....: 5 - 60 Hz: constant amplitude 0.35 mm,
..... 60 – 150 Hz: constant acceleration 5 g
Shock according to EN 60068 Part 2-27 .....: Amplitude 15 g, 11 ms duration

Miscellaneous

Dimensions (L × W × H).....: 225 × 63 × 39 mm
Attachment distance .....: 208 mm
Weight .....: approx. 420 g

Bus Data

Transfer protocol .....: PROFINET I/O
Transfer rates .....: 100 MBit/s
Addressing .....: via DCP
Cycle time.....: 2 ms

Connection Possibilities

Supply cable .....: 2 × connector 7/8" female / male connector
Data cable .....: 2 × M12 connector 5-pin
.....: (male connector, D-coded)
Outputs .....: 8 × 5-pin M12 connector
Maximum length of output cable.....: with 0.75 mm² max. 10 m
.....: with 0.34 mm² max. 5 m

Power Supply

Voltage U_s / U_a over 7/8” power in connector.....: 24 VDC
Voltage U_s / U_a range.....: 18 – 30 VDC
Actuator supply 7/8” power in connector .....: max. 9 A
Sensor supply 7/8” power in connector .....: max. 9 A
Current consumption (without In-/Output).....: <= 130 mA

Outputs

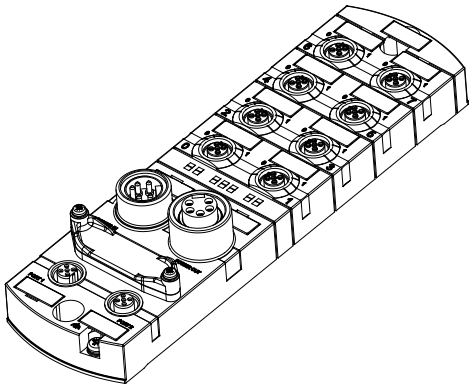
Number of outputs.....: 8
Actuator current load .....: approx. 2 A per actuator
Switching frequency.....: approx. 50 Hz 50% duty ratio
Switching frequency inductive load .....: approx. 10 Hz 50% duty ratio
Lamp load.....: max. 40 W

7.4 Art. No. 55094 IMPACT67 PN DO16

General

PROFINET I/O Device IP67

with 16 outputs



[M12 socket, contact 4] → 8 outputs

[M12 socket, contact 2] → 8 outputs

EMC

EN 61000-4-2 ESD .....: Contact ± 4 kV, air ± 8 kV
EN 61000-4-3 RF-Field .....: 10 V/m
EN 61000-4-4 Burst .....: ± 2 kV
EN 61000-4-5 Surge .....: asym./symm. ± 500 V (DC net input)
..... asym. ± 1 kV (Signal connections)
EN 61000-4-6 HF-asymmetric .....: 3 V
EN 61000-4-8 Magnetic field 50 Hz .....: 30 A/m
EN 55011 Interference field strength .....: QP 40 dBµV/m (30 - 230 MHz)
..... QP 47 dBµV/m (230 - 1000 MHz) (class A)

Ambient Conditions

Operating temperature .....: 0°C ... +55°C
Storage temperature.....: -25°C … +70°C
Enclosure type according to IEC 60529 .....: IP 67

Mechanical Ambient Conditions

Oscillation according to EN 60068 Part 2-6.....: 5 - 60 Hz: constant amplitude 0,35 mm,
..... 60 – 150 Hz: constant acceleration 5 g
Shock according to EN 60068 Part 2-27 .....: Amplitude 15 g, 11 ms duration

Miscellaneous

Dimensions (L × W × H).....: 225 × 63 × 39 mm
Attachment distance .....: 208 mm
Weight .....: approx. 420 g

Bus Data

Transfer protocol .....: PROFINET I/O
Transfer rates .....: 100 MBit/s
Addressing .....: via DCP
Cycle time.....: 2 ms

Connection Possibilities

Supply cable .....: 2 × connector 7/8" female / male connector
Data cable .....: 2 × M12 connector 5-pin
.....: (male connector, D-coded)
Outputs .....: 8 × 5-pin M12 connector
Maximum length of output cable.....: with 0.75 mm² max. 10 m
.....: with 0.34 mm² max. 5 m

Power Supply

Voltage U_s / U_a over 7/8” power in connector.....: 24 VDC
Voltage U_s / U_a range.....: 18 – 30 VDC
Actuator supply 7/8” power in connector .....: max. 9 A
Sensor supply 7/8” power in connector .....: max. 9 A
Current consumption (without In-/Output).....: <= 130 mA

Outputs

Number of outputs.....: 16
Actuator current load .....: approx. 0.5 A per actuator
Switching frequency.....: approx. 50 Hz 50% duty ratio
Switching frequency inductive load .....: approx. 10 Hz 50% duty ratio
Lamp load : max. 10 W

Abbreviations

Actuator Short-Circuit	Short-circuit or overload at an output results in output switchoff. This fault is signaled via the diagnostic data contained in the input data. A red LED indicates the error at the associated M12 socket. There is no automatic output restart. It is necessary to switch off the output via the controller after the cause of the error is rectified. This clears the diagnostic message.
DI	Digital Input
DIN	German Standards Institute
DO	Digital Output
EN	European Standard
EC	European Community
EMC	Electromagnetic Compatibility
IEC	International Electrotechnical Commission
ISO	International Standards Organization
LED	Light Emitting Diode
MS	Module Status
NS	Network Status
OSI	Open Systems Interconnection
PLC	Programmable Logic Control
Sensor Short-Circuit	Short-circuit or overload at Pin 1 of the M12 socket trips the self-resetting circuit-breaker. Every M12 socket has a separate circuit-breaker. A red LED indicates the error at the associated M12 socket. This fault is signaled via the diagnostic data contained in the input data. After the error is rectified, the sensor power supply is restarted automatically.

Undervoltage	The voltages of the module / sensor power supply and actuator power supply are detected separately. If a voltage of 18 VDC is exceeded, this fault is signaled by the diagnostic data contained in the input data. If there is a module / sensor power supply undervoltage, the LED labeled "US Power" lights up. If there is an actuator power supply undervoltage, the LED labeled "UA Power" lights up.

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